

Proposed ATM / Sounding Radar Flight Lines for the Antarctic Peninsula

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ICE BRIDGE DC-8 Antarctic Flight Line,
Science, and Instrument Planning Meeting

*NASA Goddard Space Flight Center
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Philosophy of Flight Line Design

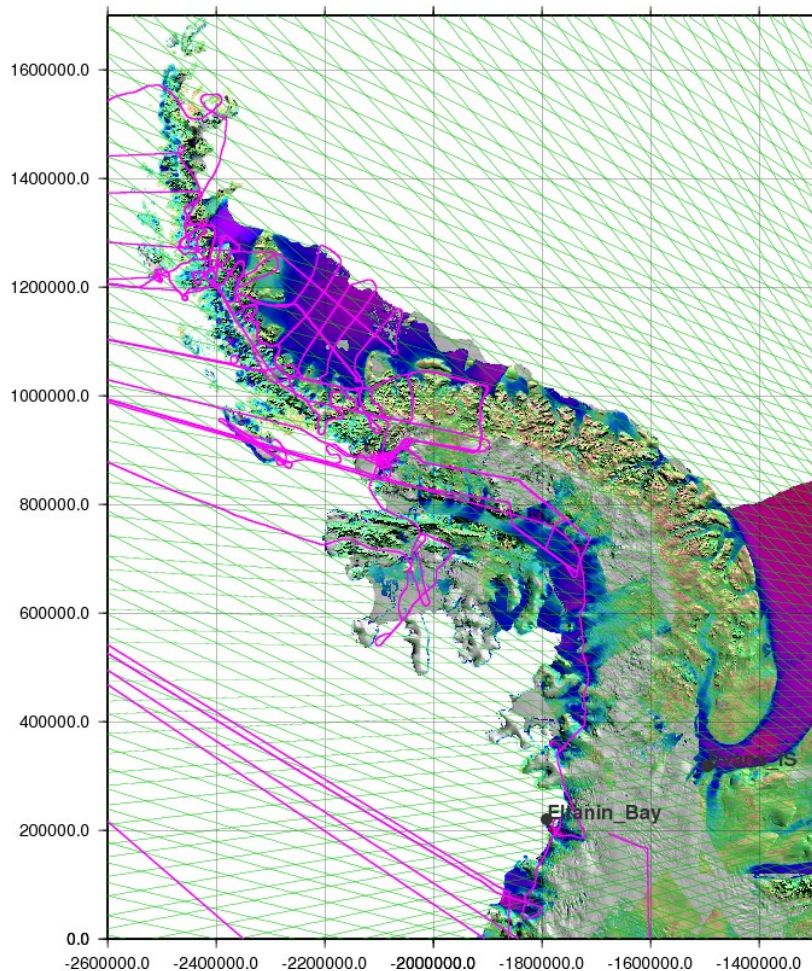
- In keeping with NASA's IceBridge concept, we overfly ICESat orbits over areas of particular scientific interest (certain active glaciers, Larsen-C ice shelf, etc)
- Leverage NASA's previous investment in operations with Chileans – 2002, 2004, 2008 - by repeating those lines
- Other targets as justification arises and resources allow
- R. Thomas, E. Rignot, I. Joughin contributors

Inputs to Flight Line Design

- ICESat 91/33 reference ground track
- Precise trajectories from previous ATM campaigns
- InSAR ice velocity maps (courtesy E. Rignot) - more below
- Simplified DC-8 endurance model built from data supplied by F. Cutler – more below
- USGS GTOPO30 digital elevation model

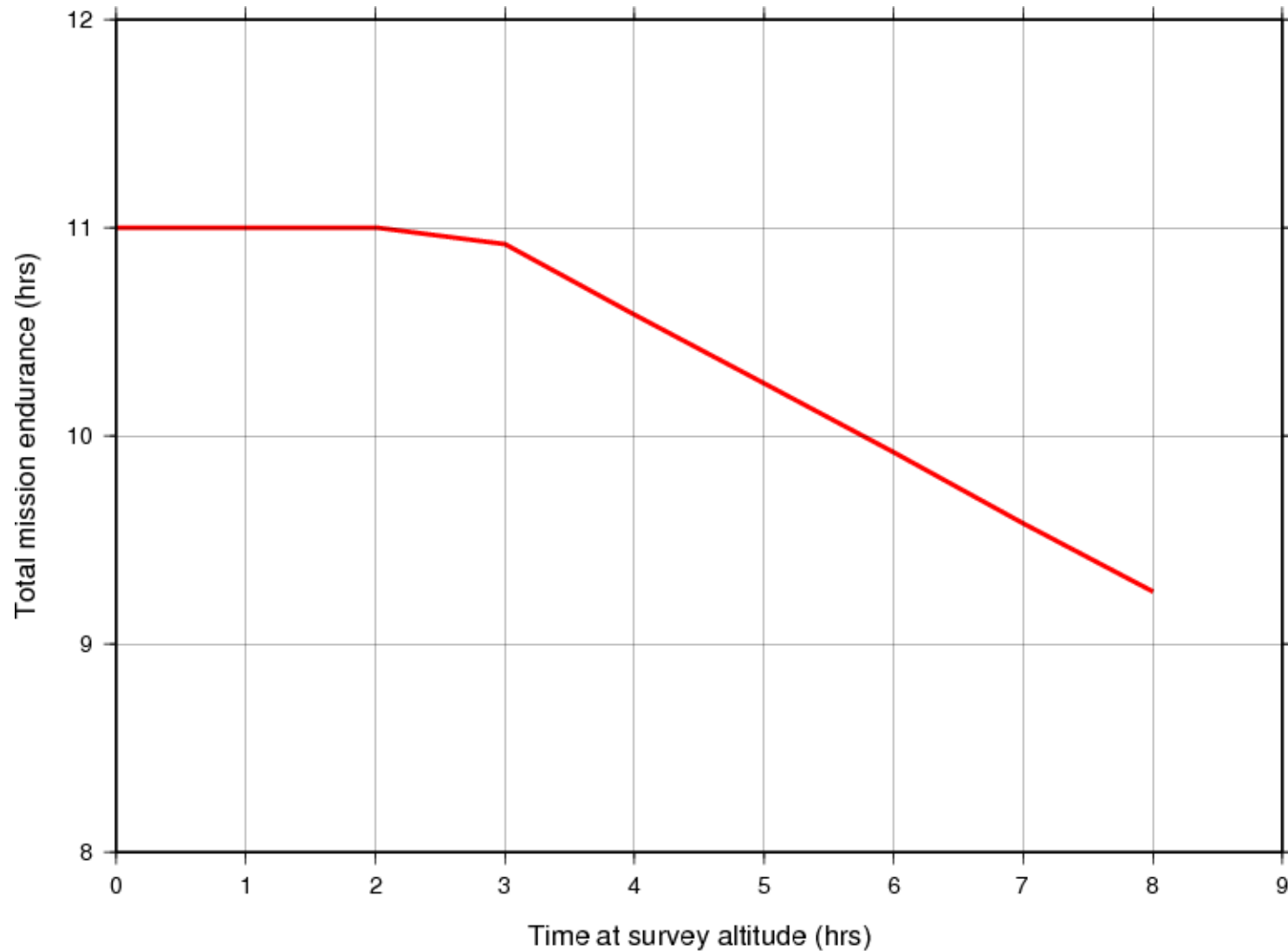
Background Data

Antarctic Peninsula



- InSAR ice velocities
 - Warm colors fast, cool slow
 - Draped over Radarsat mosaic
- ICESat 33-day subcycle (green)
- 2002, 2004 and 2008 ATM (pink)

Simplistic DC-8 Endurance Model

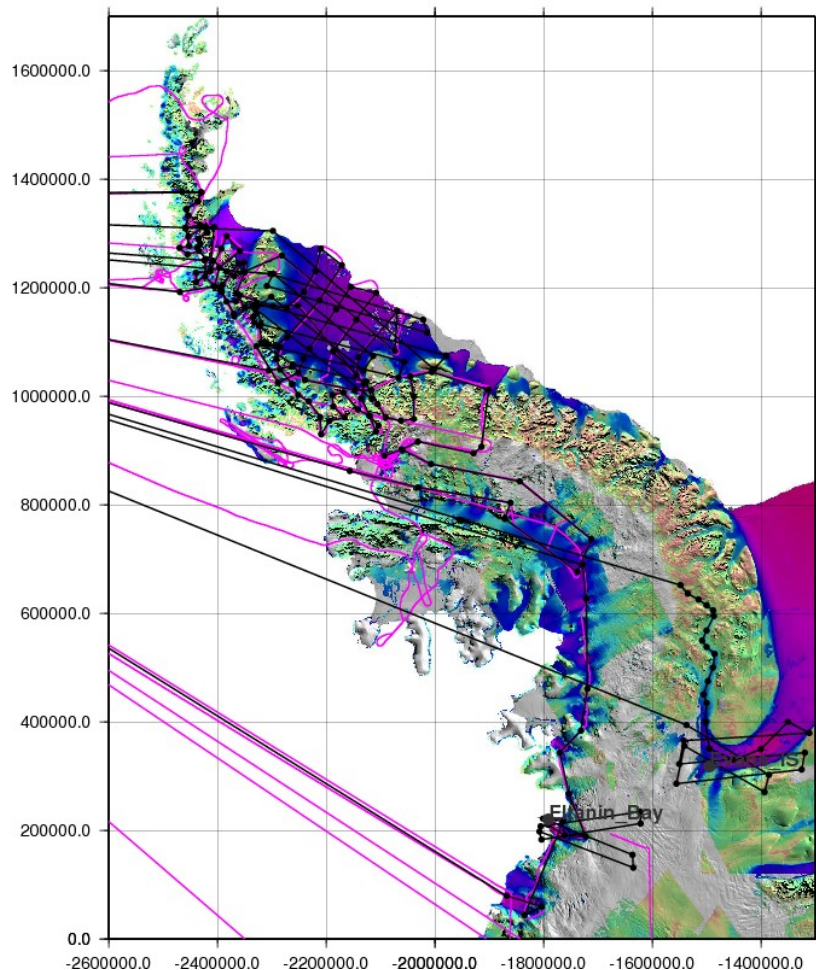


Key Unknowns

- Is my simplified endurance model of sufficient fidelity, esp with extended low-alt ops?
- Can the DC-8 turn with the P-3 to repeat historical lines (~250 knots)?
- Can we integrate precise steering methodology into DC-8 ops?
- Can the DC-8 sufficiently terrain-follow at low altitudes to keep lidar within usable range to surface?

Peninsula Overview

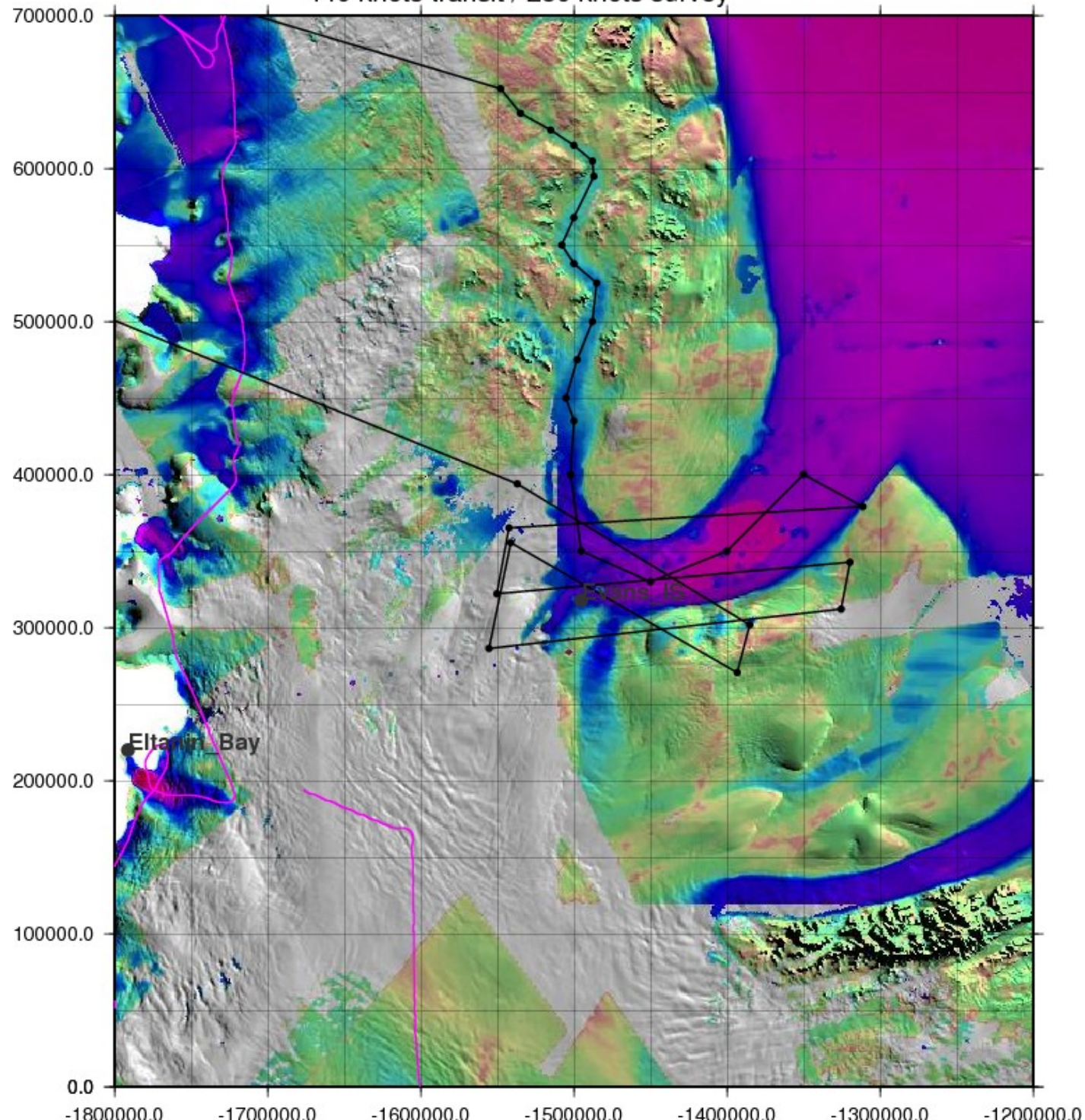
Antarctic Peninsula



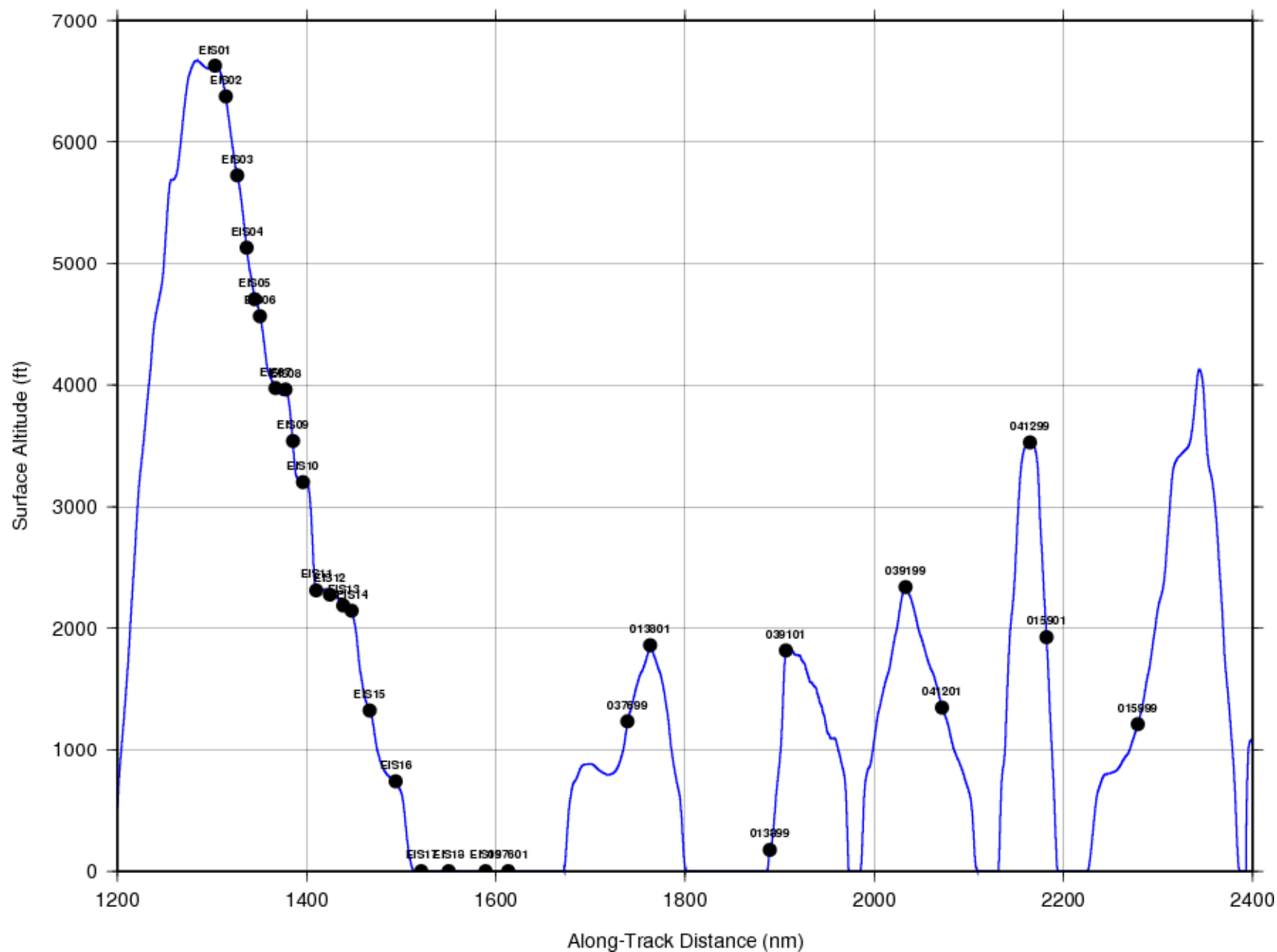
- 6 missions depicted
- One of these is unflyable as shown
- Combination of repeats of P-3 flights and new missions, mainly ICESat tracks

Peninsula 5

10.4 hrs total / 4.4 hrs survey
440 knots transit / 250 knots survey

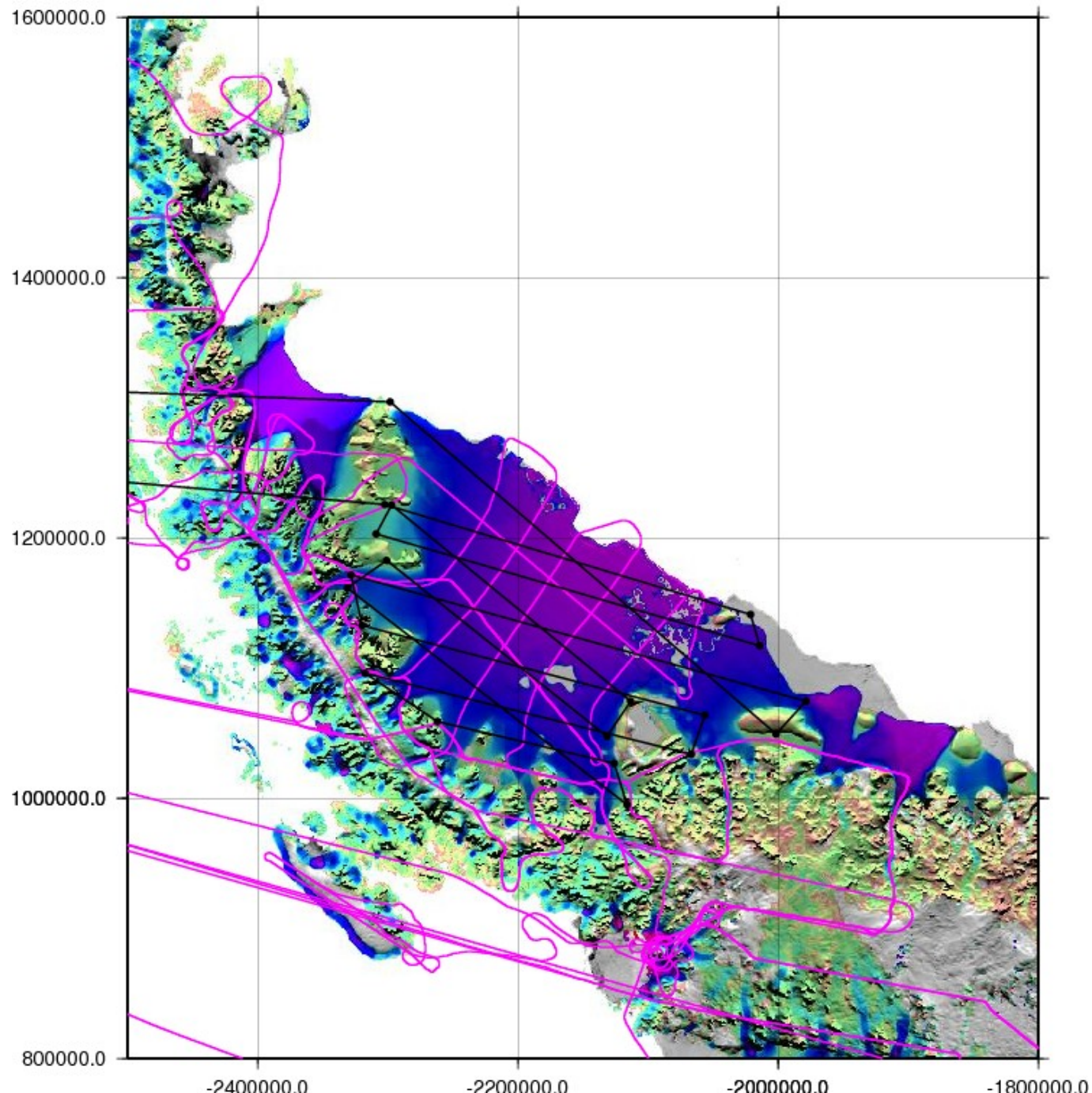


Terrain Profile for PEN5 Mission

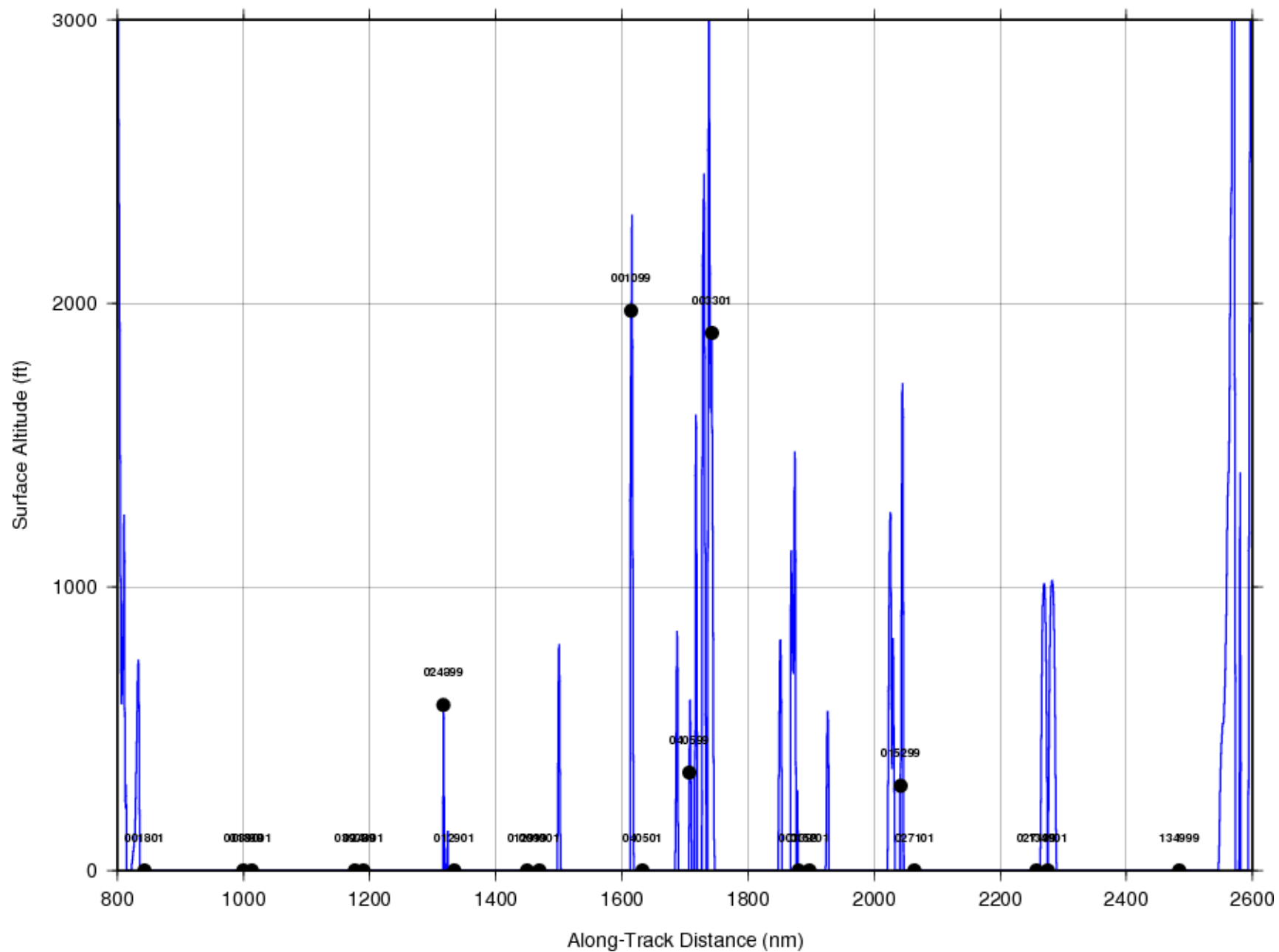


Peninsula 6

11.3 hrs total / 7.5 hrs survey
440 knots transit / 250 knots survey

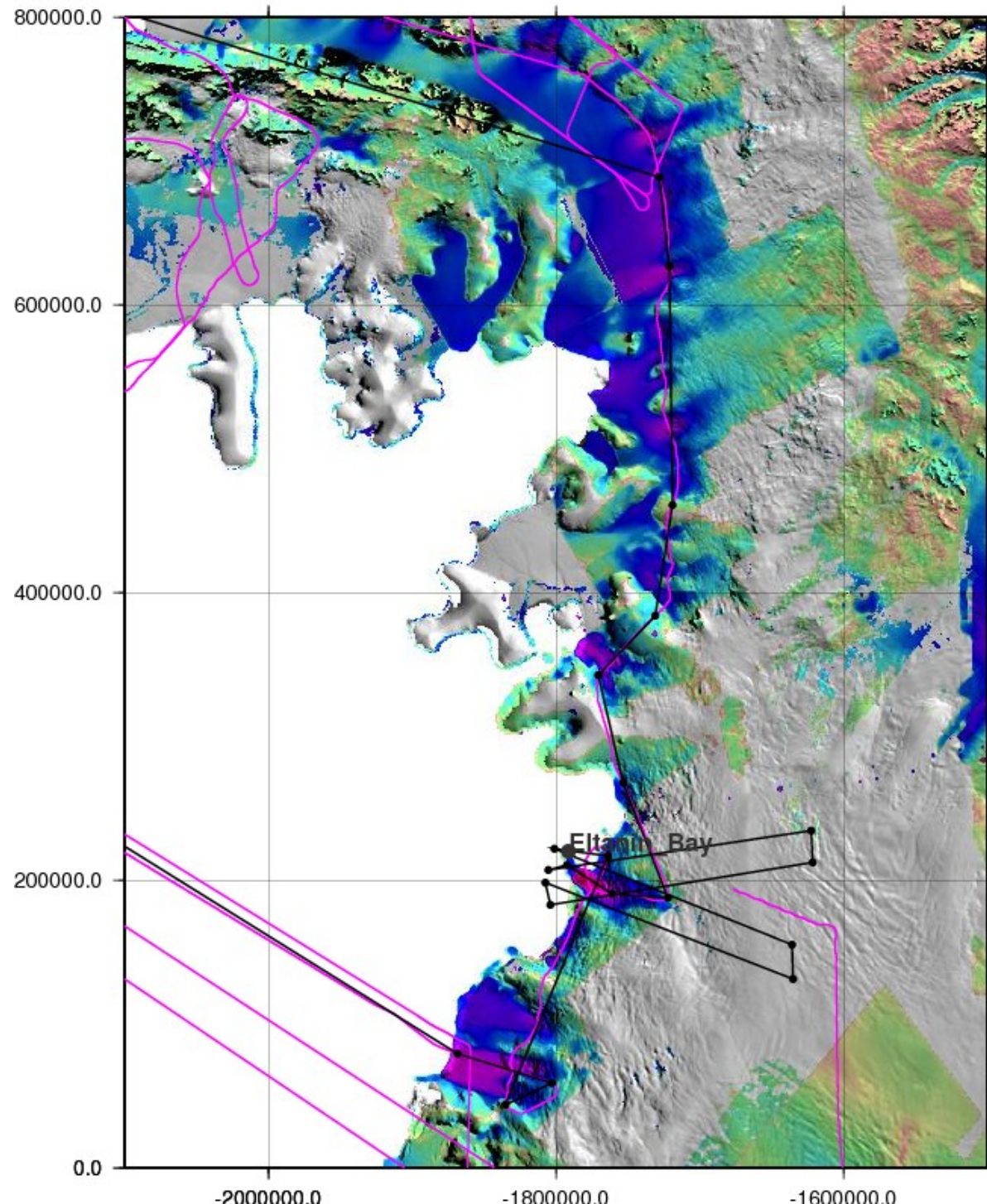


Terrain Profile for PEN6 Mission

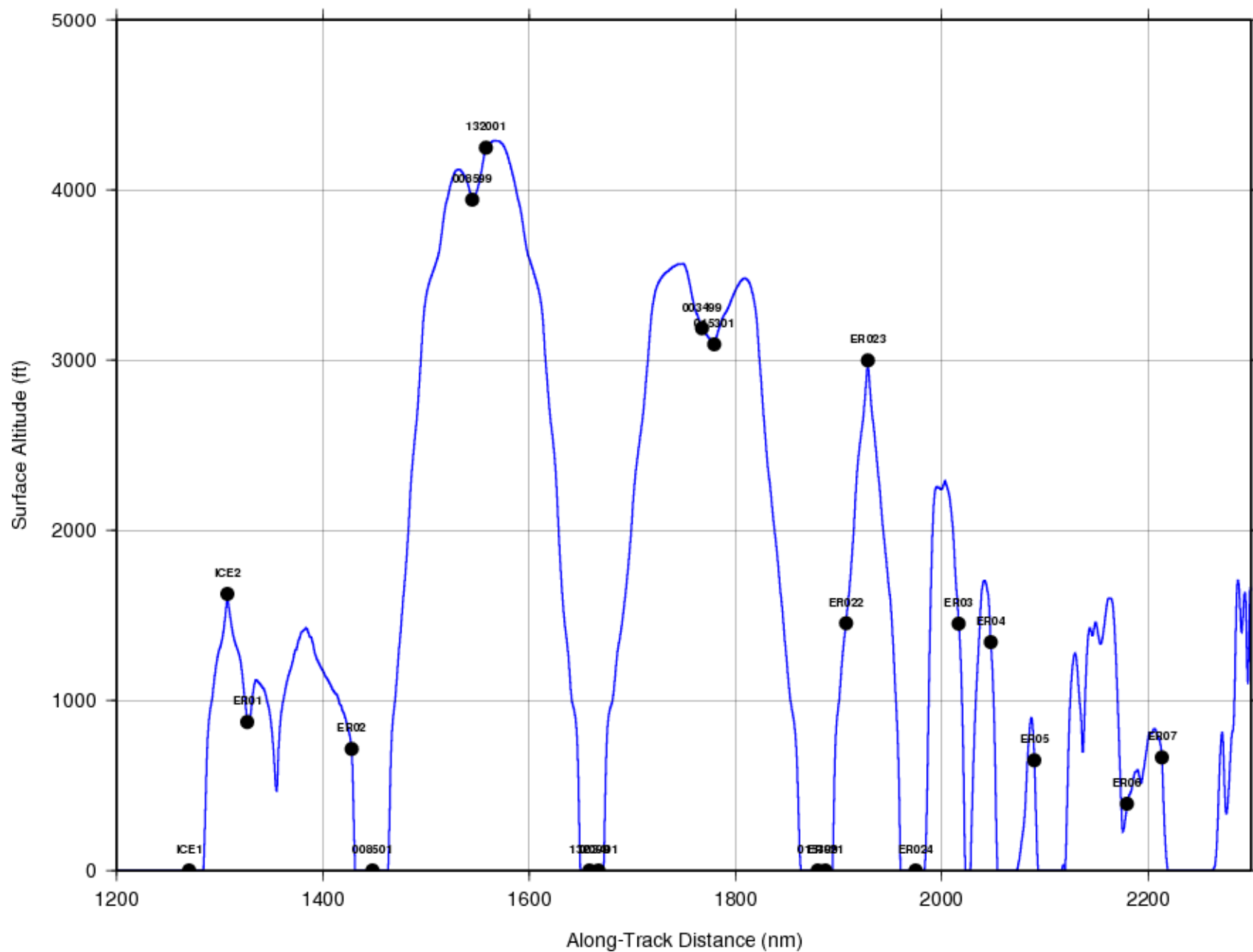


Peninsula 1

10.0 hours total / 3.8 hrs survey
440 knots transit / 250 knots survey

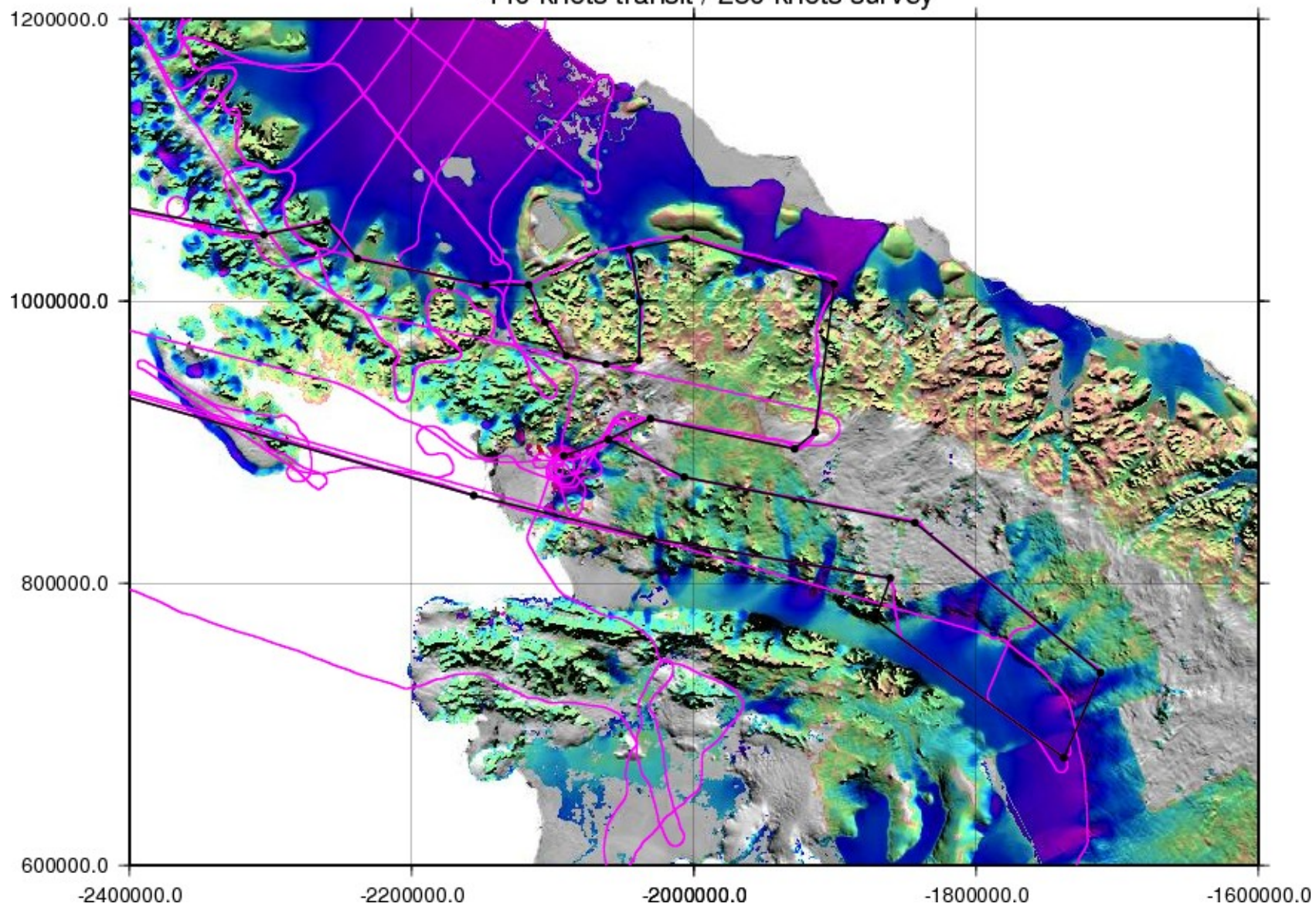


Terrain Profile for PEN1 Mission

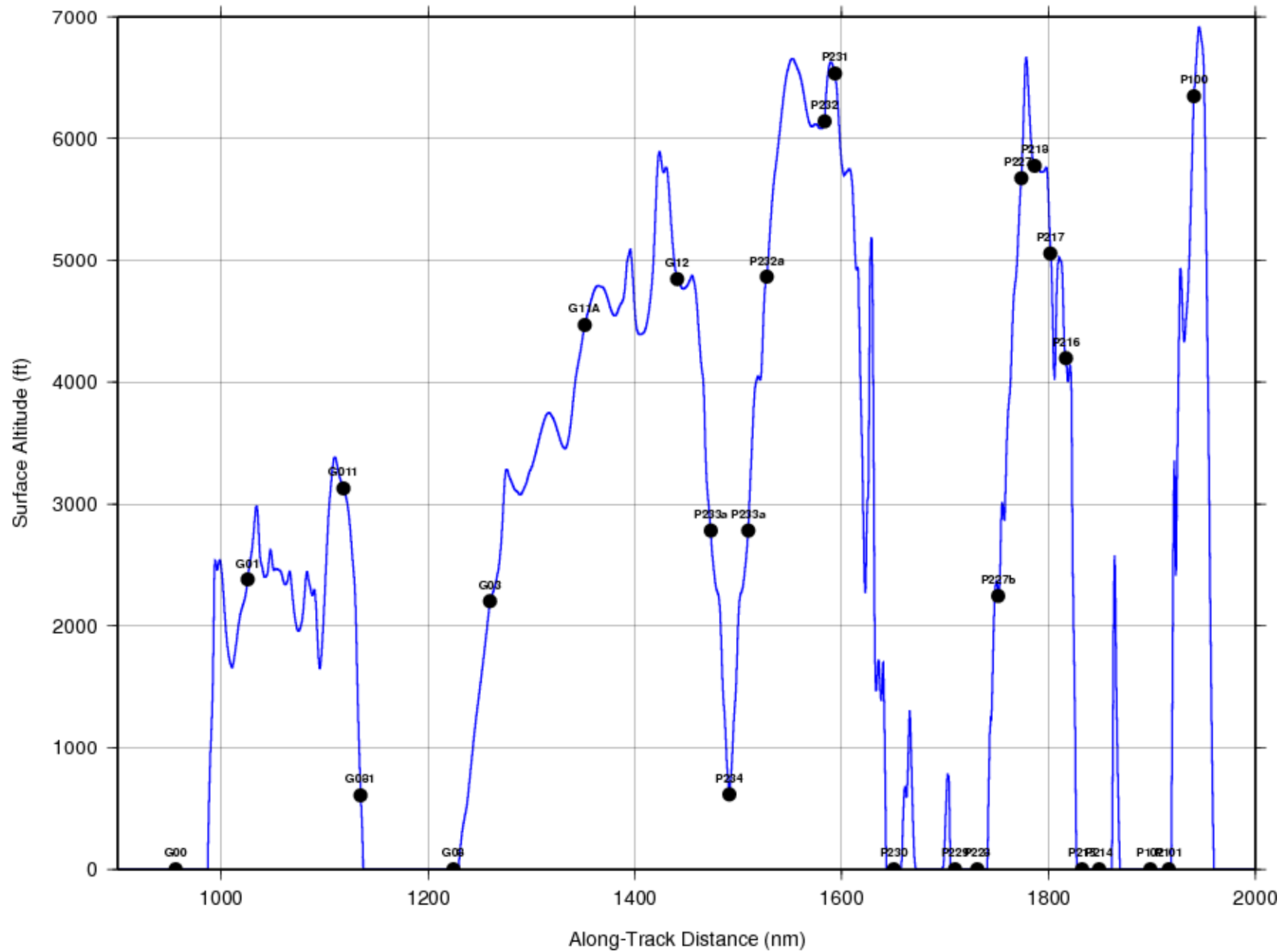


Peninsula 2

8.3 hours total / 4.1 hrs survey
440 knots transit / 250 knots survey

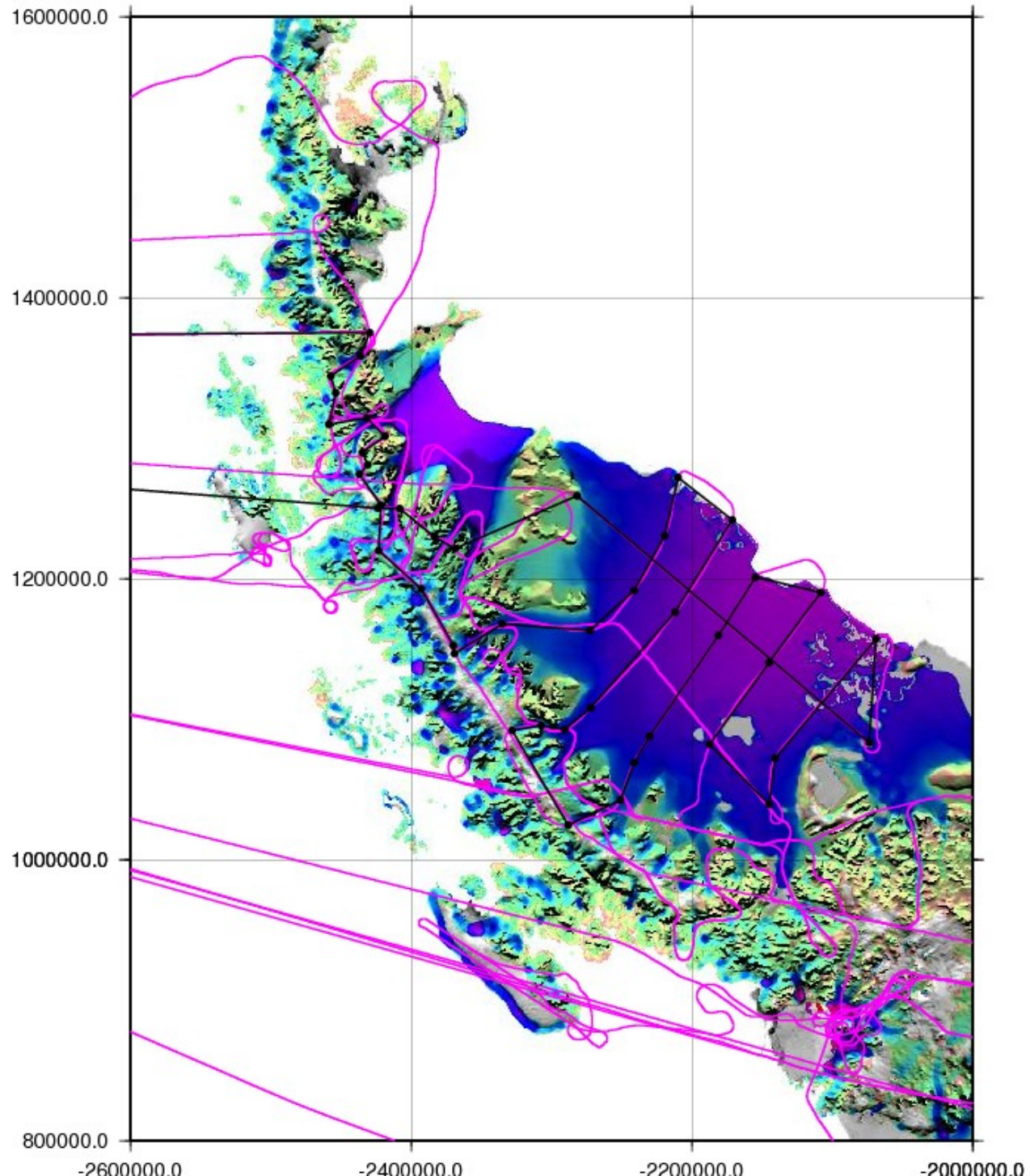


Terrain Profile for PEN2 Mission

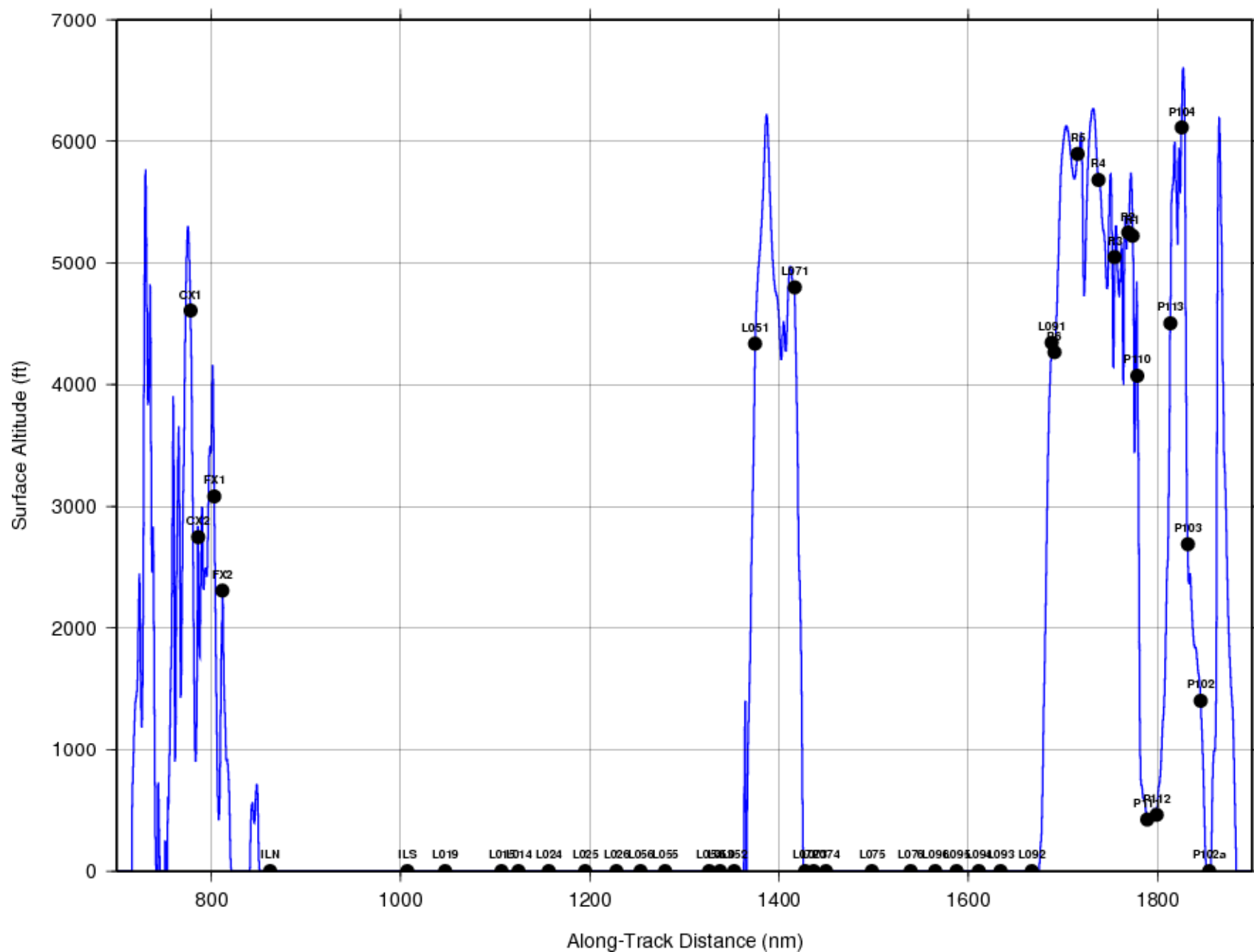


Peninsula 4

8.4 hrs total / 4.9 hrs survey
440 knots transit / 250 knots survey

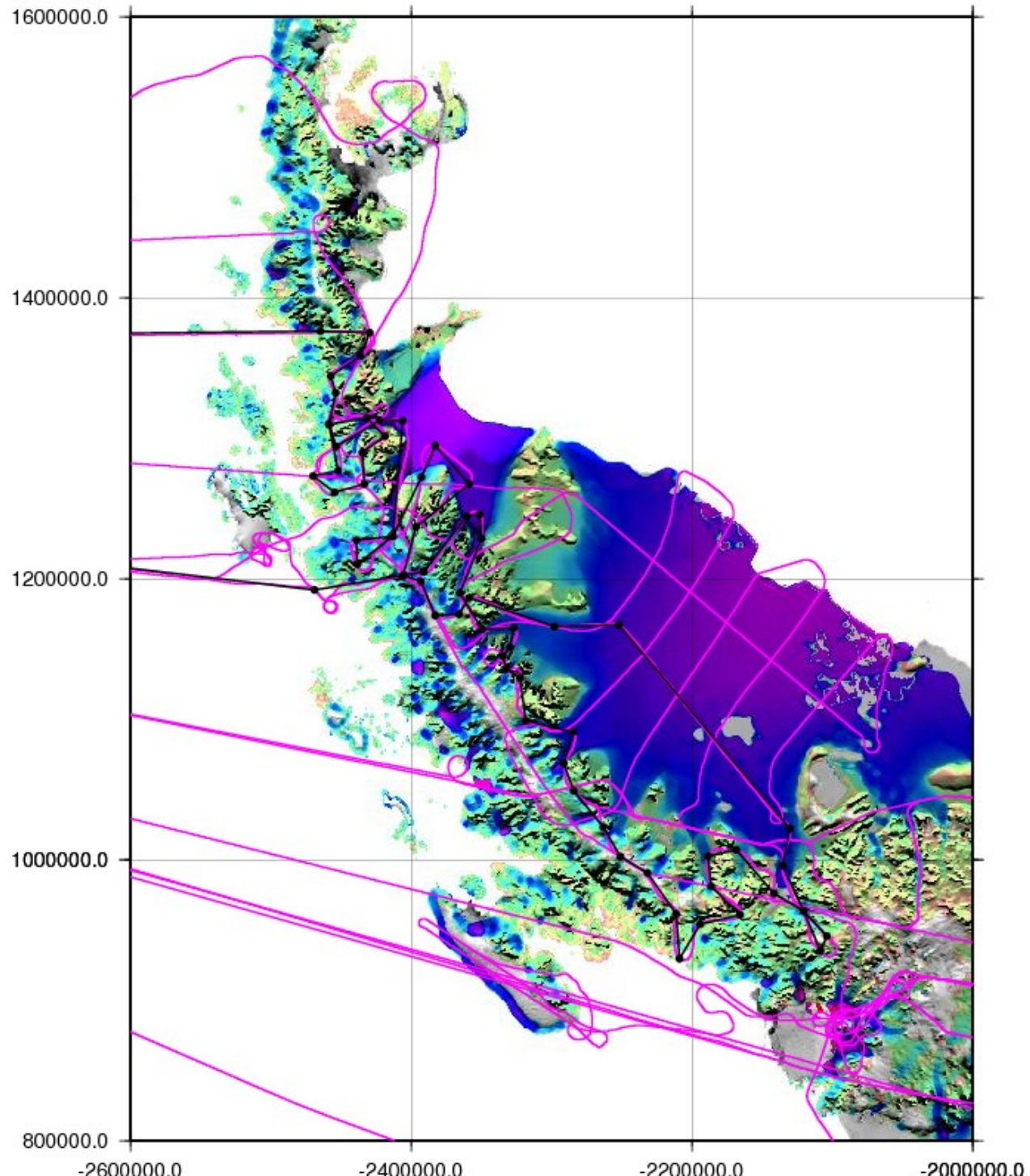


Terrain Profile for PEN4 Mission

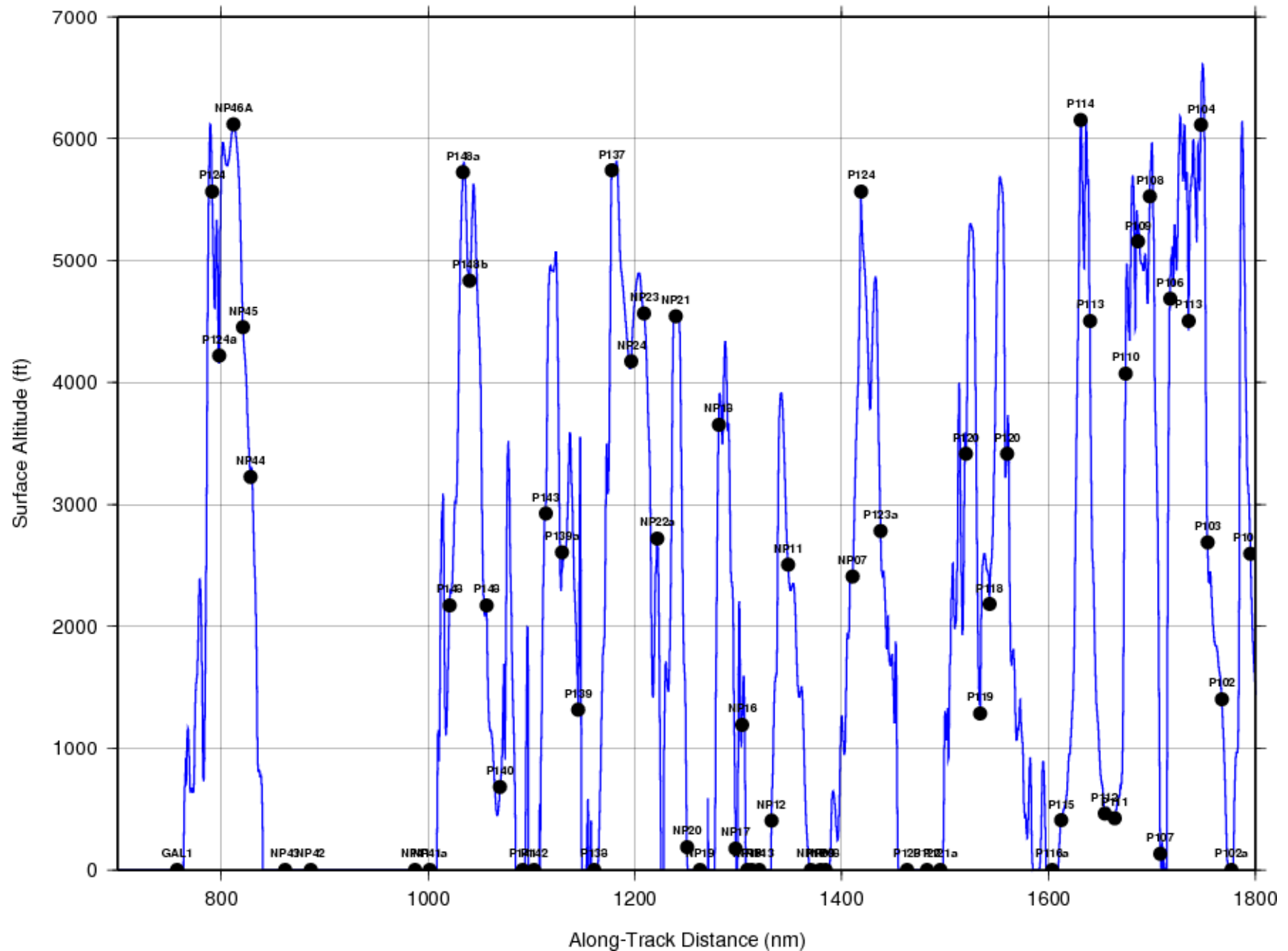


Peninsula 3

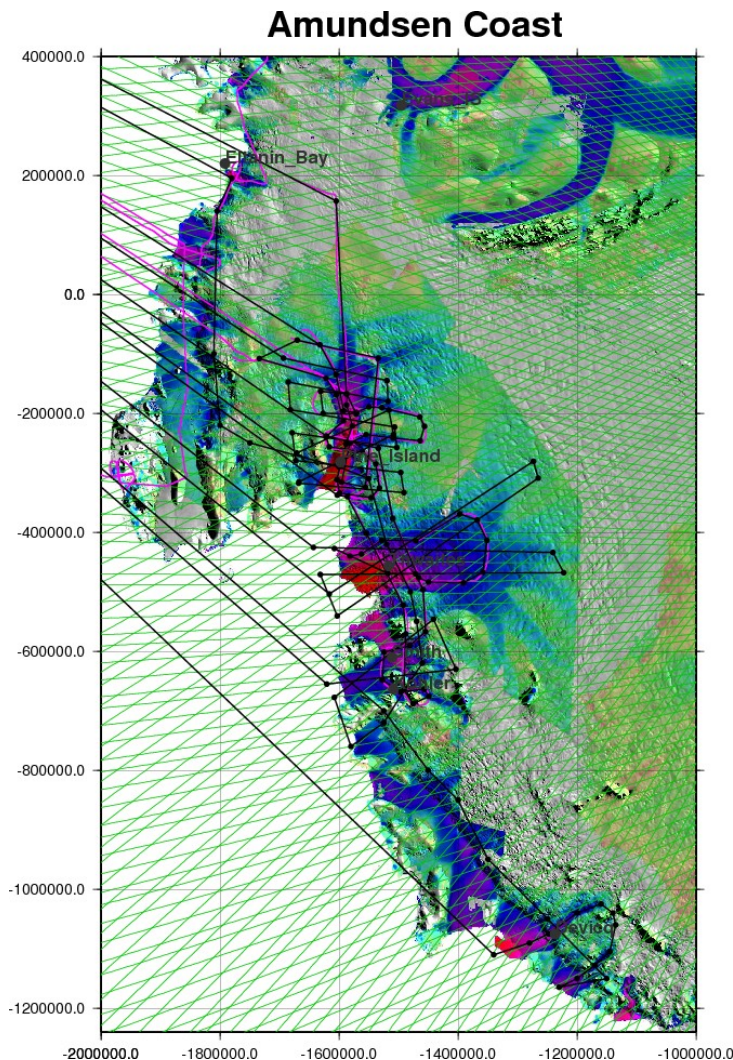
8.0 hours total / 4.6 hrs survey
440 knots transit / 250 knots survey



Terrain Profile for PEN3 Mission



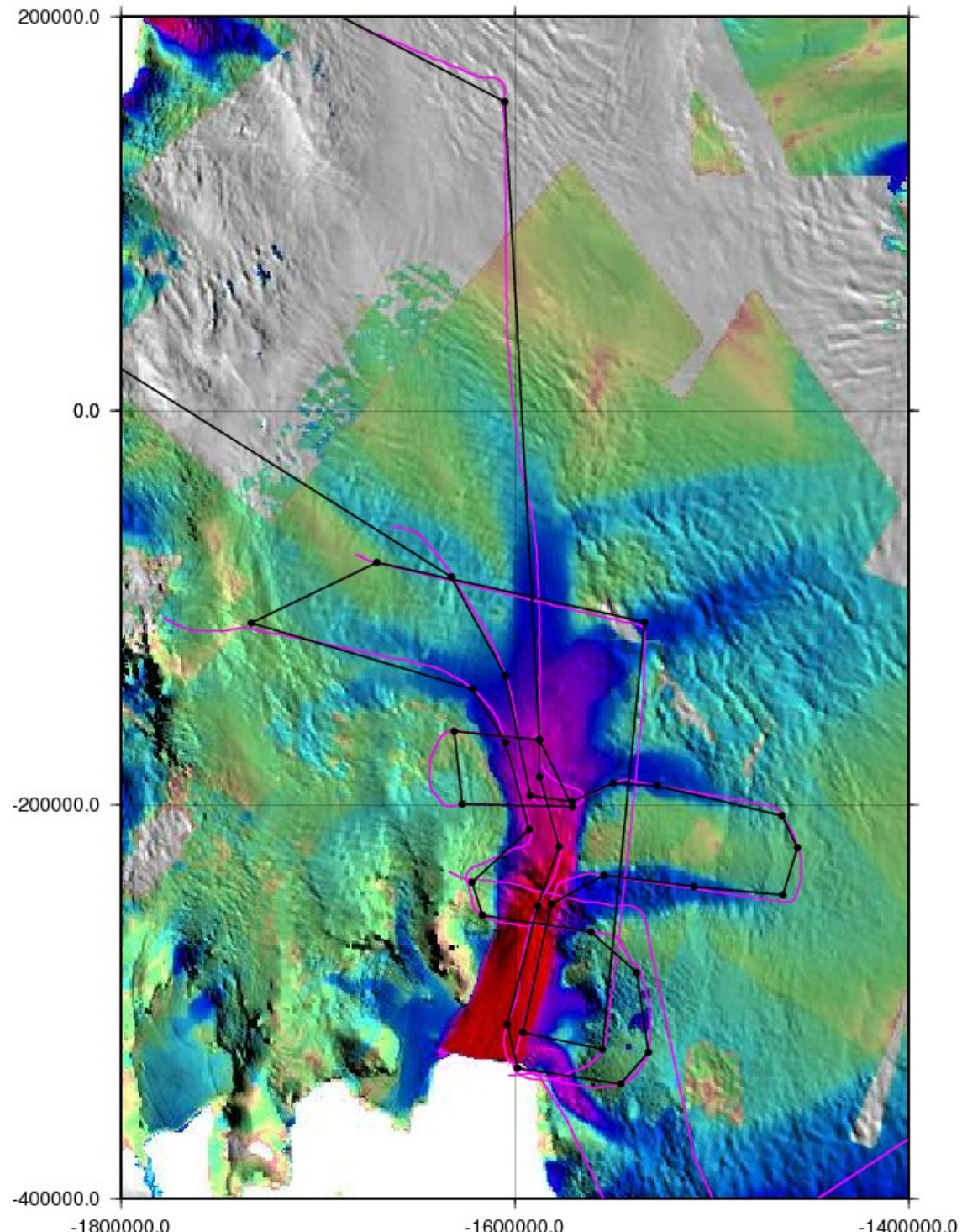
Amundsen Overview



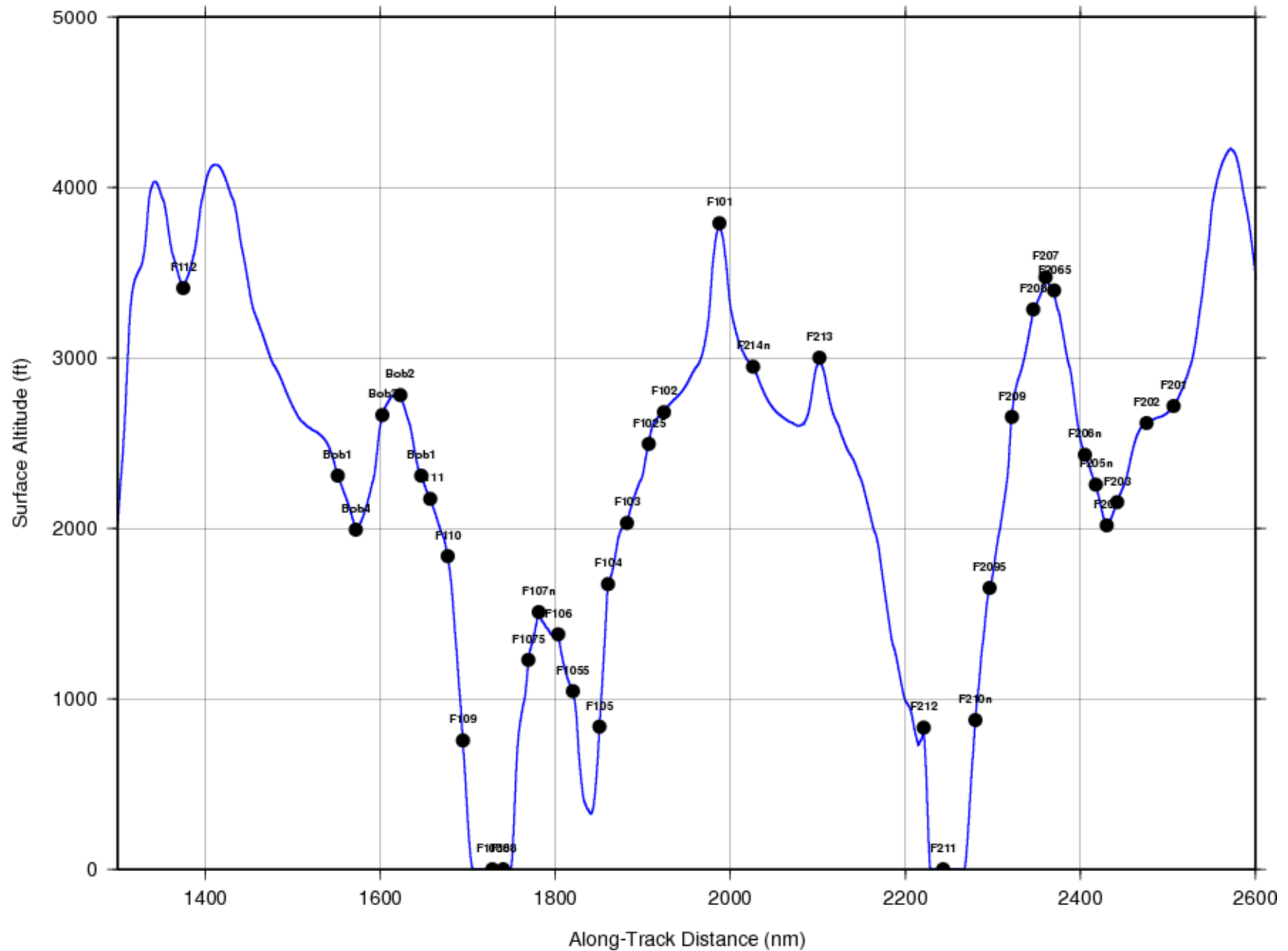
- 6 flights depicted
- 2 repeat P-3 surveys
- 4 new missions
- Characterized by longer transits and gentler terrain than the Peninsula

Pine Island 1

10.9 hrs total / 4.5 hrs survey
440 knots transit / 250 knots survey

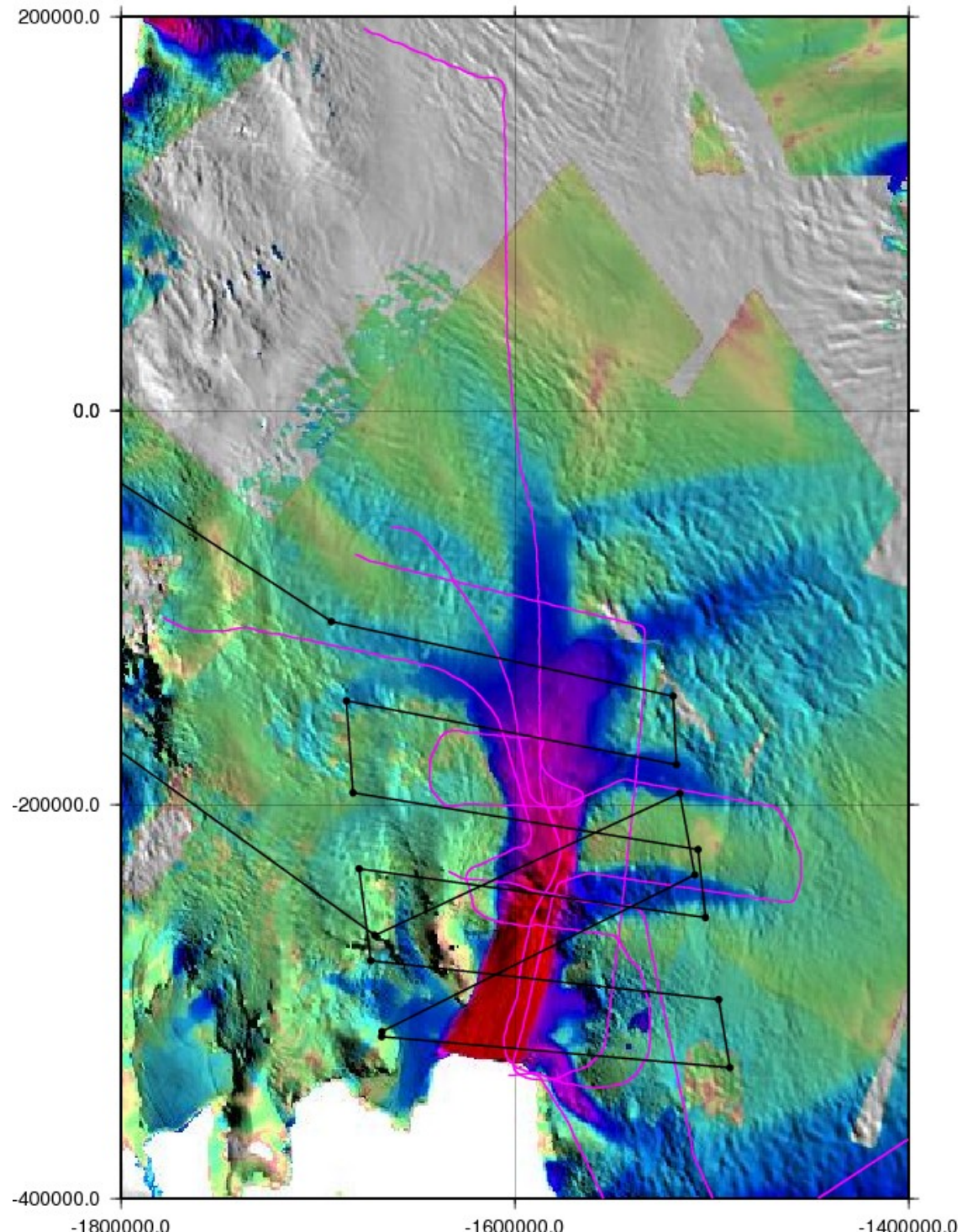


Terrain Profile for PIG 1 Mission

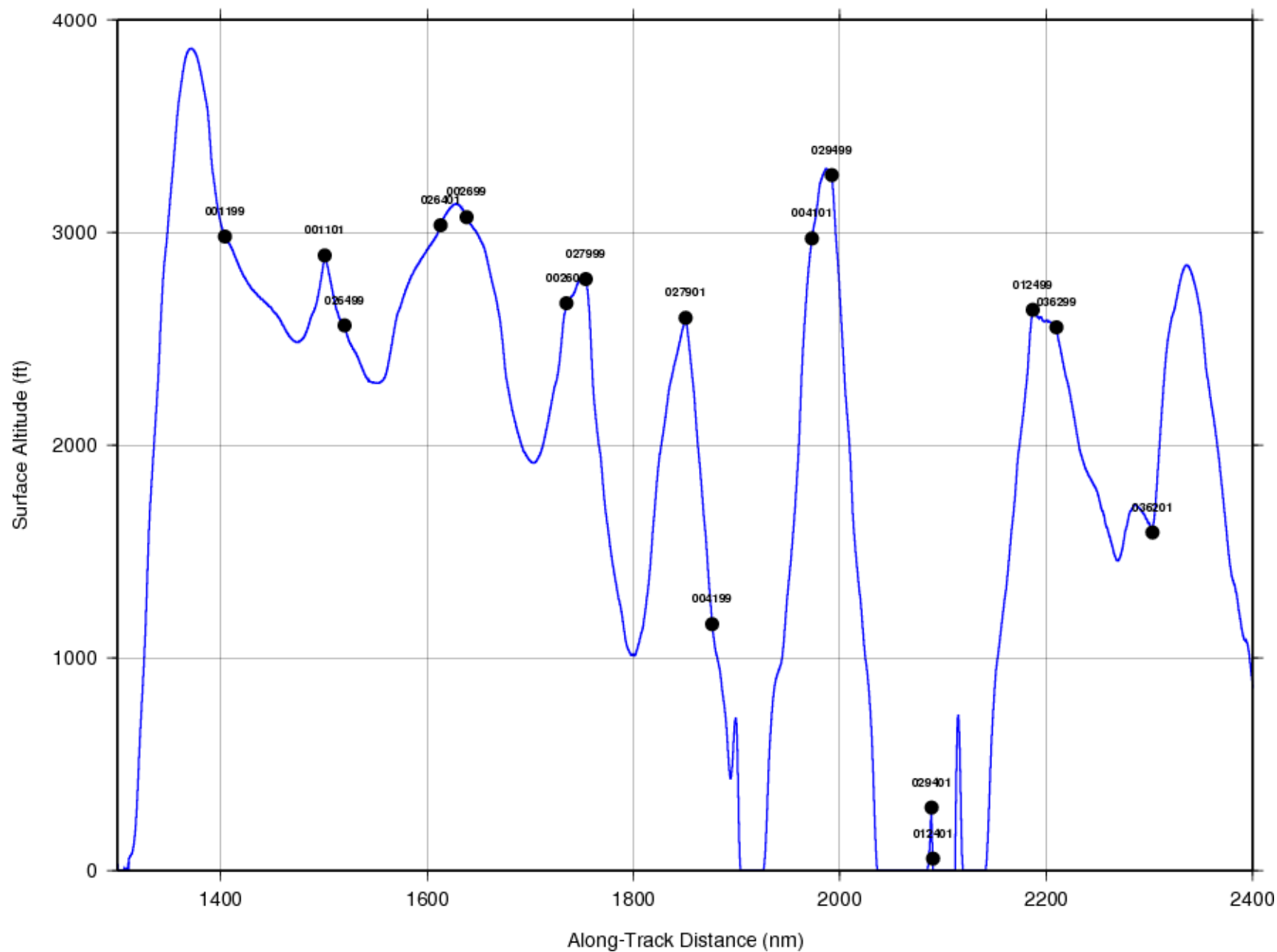


Pine Island 2

10.8 hrs total / 3.6 hrs survey
440 knots transit / 250 knots survey

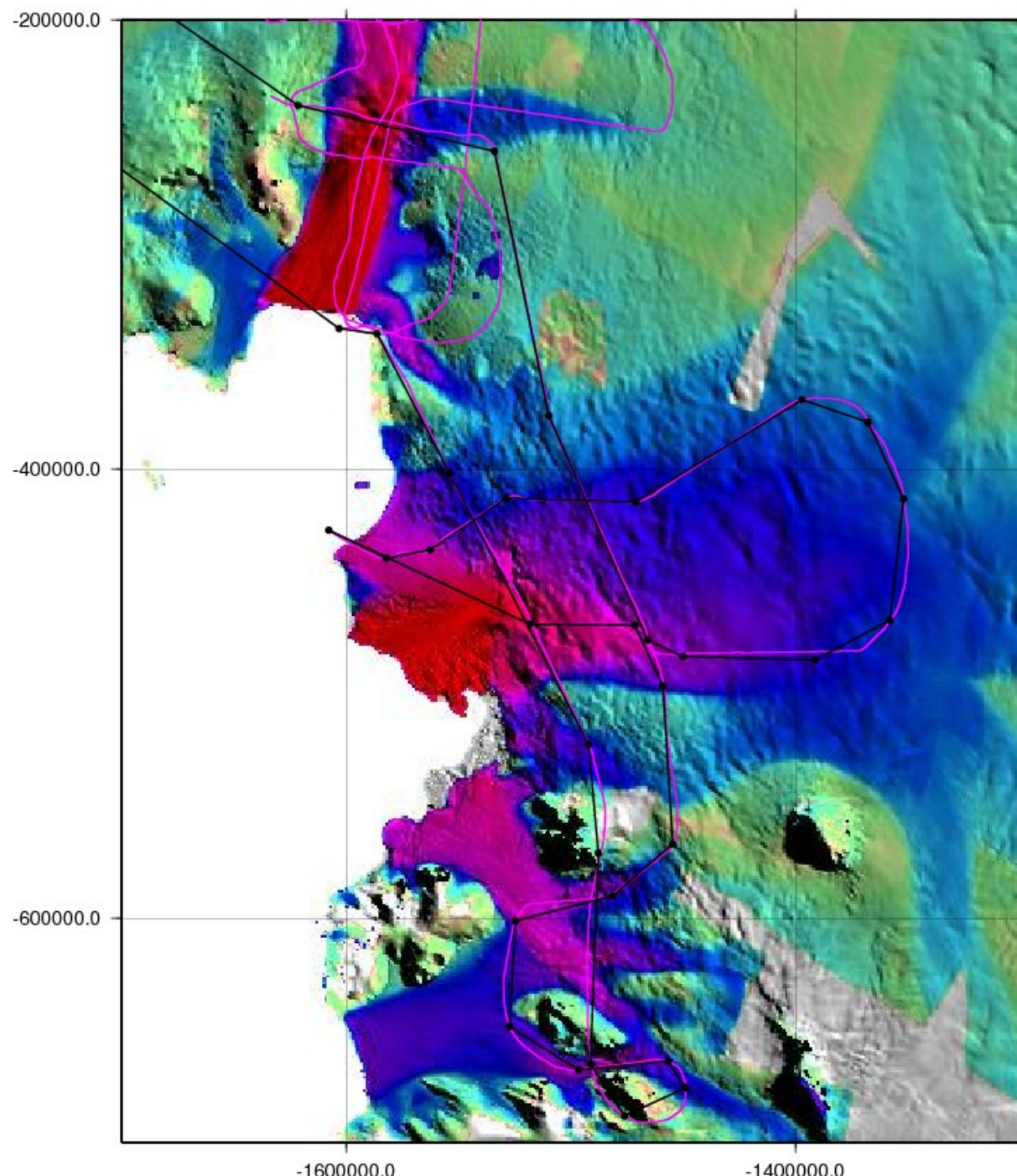


Terrain Profile for PIG 2 Mission

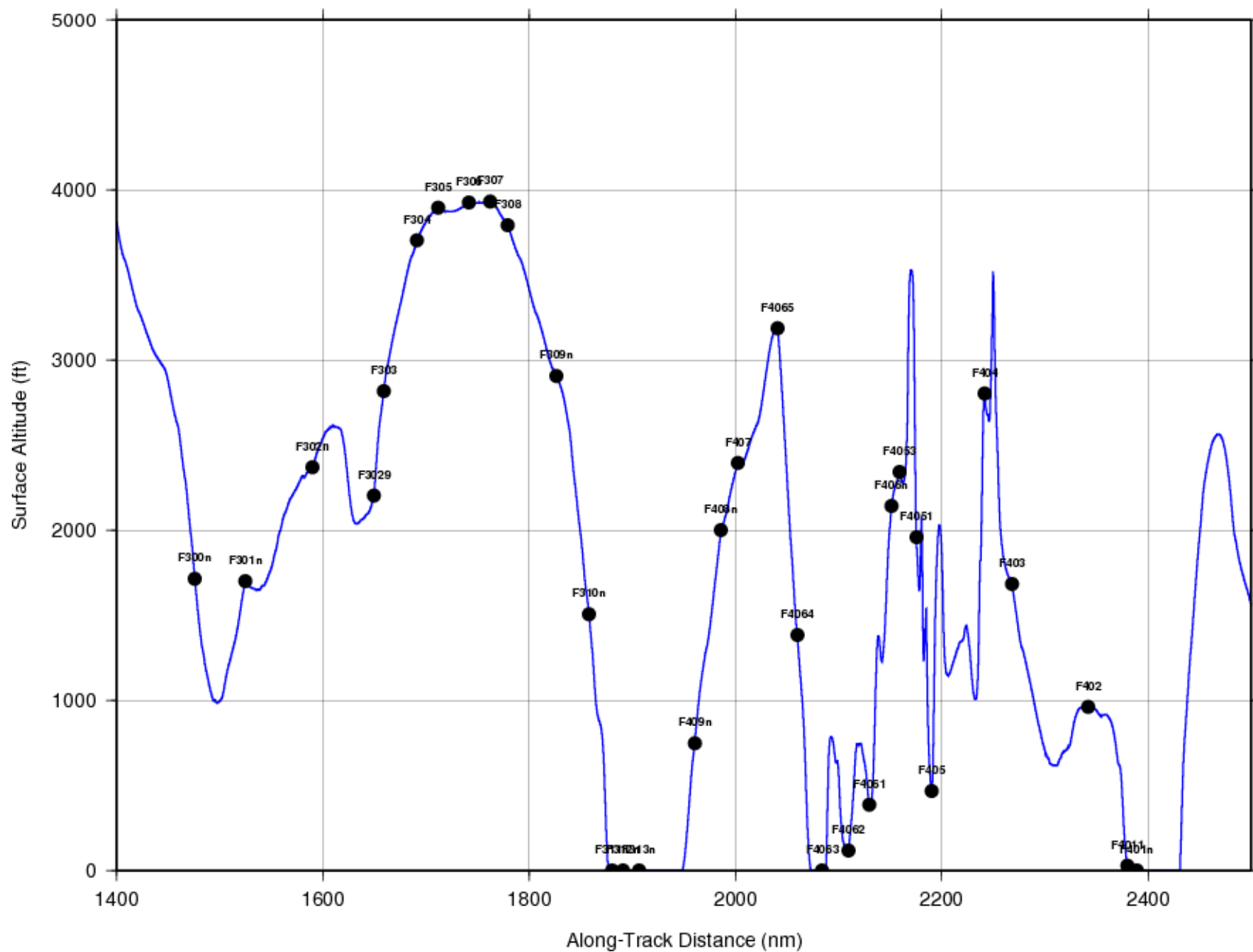


Thwaites-Smith-Kohler 1

10.5 hrs total / 3.7 hrs survey
440 knots transit / 250 knots survey

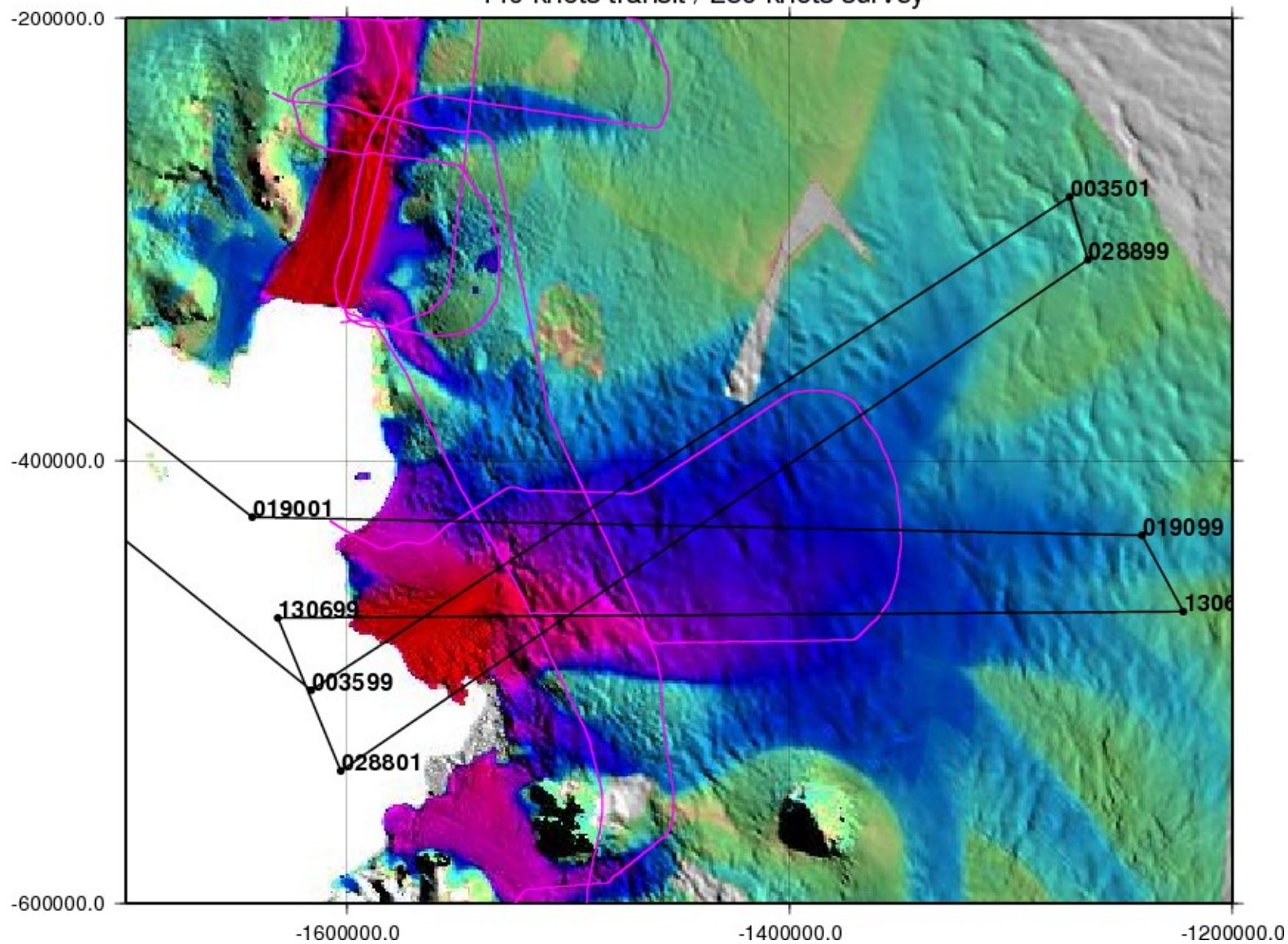


Terrain Profile for TSK 1 Mission

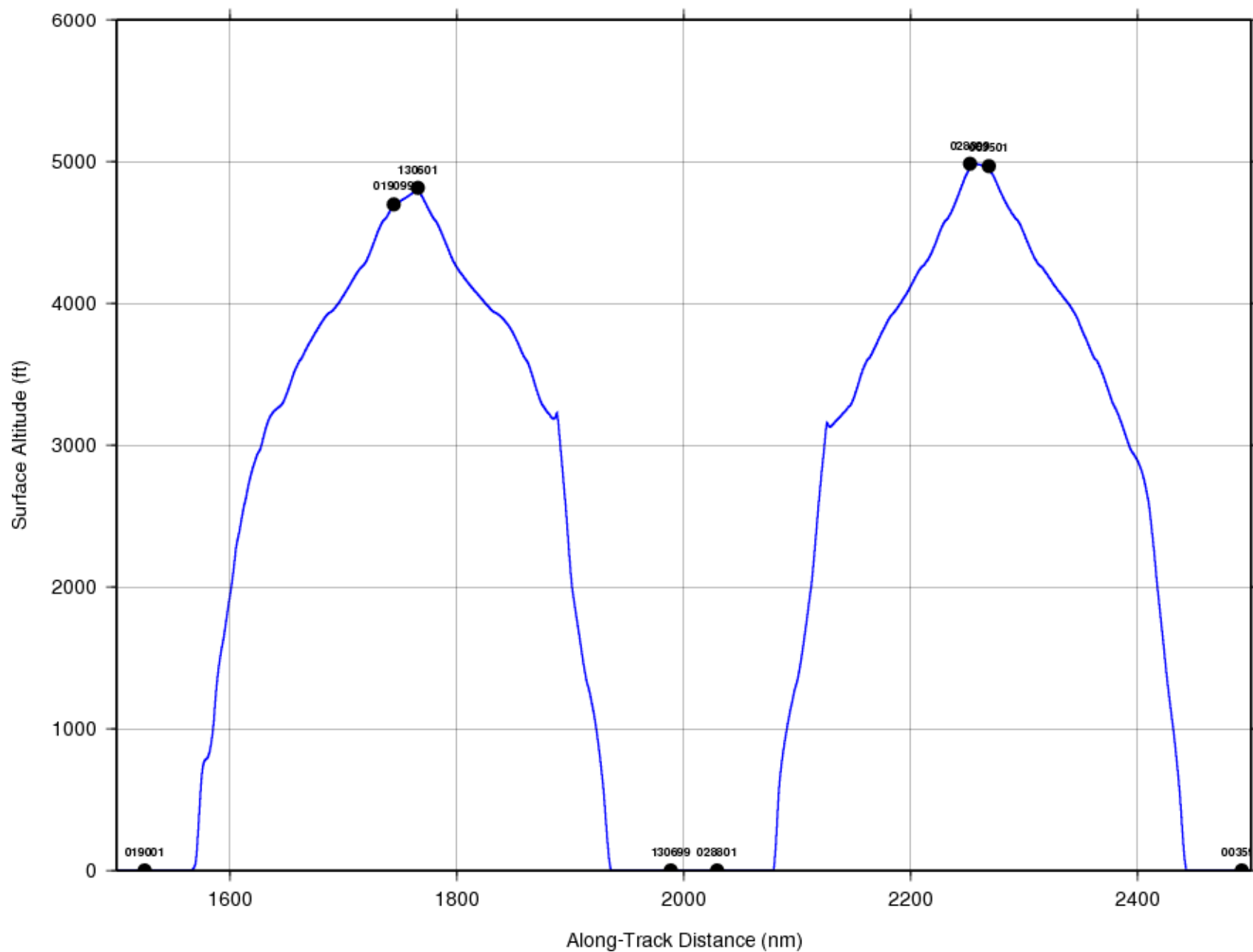


Thwaites-Smith-Kohler 2

10.9 hrs total / 3.9 hrs survey
440 knots transit / 250 knots survey

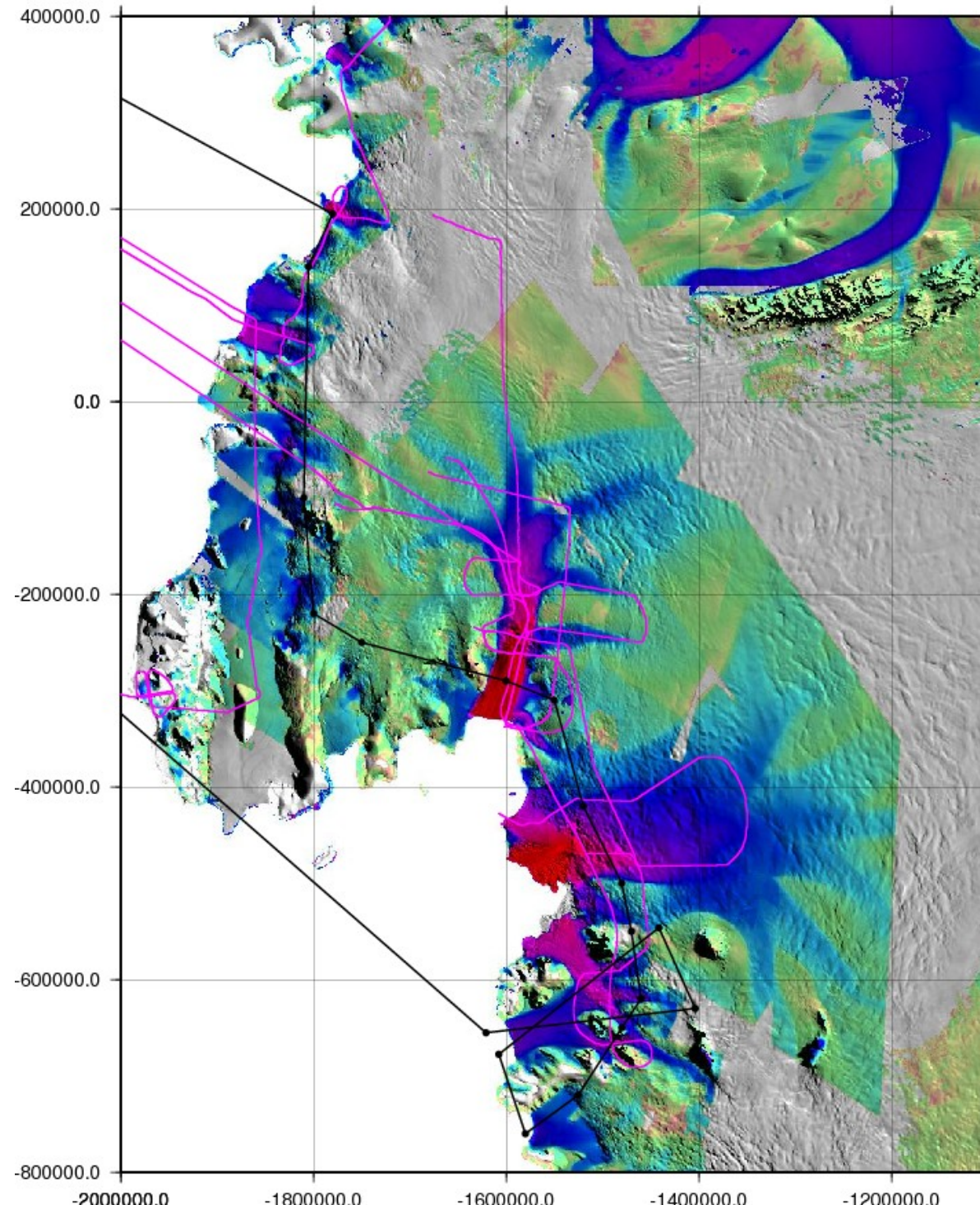


Terrain Profile for TSK 2 Mission

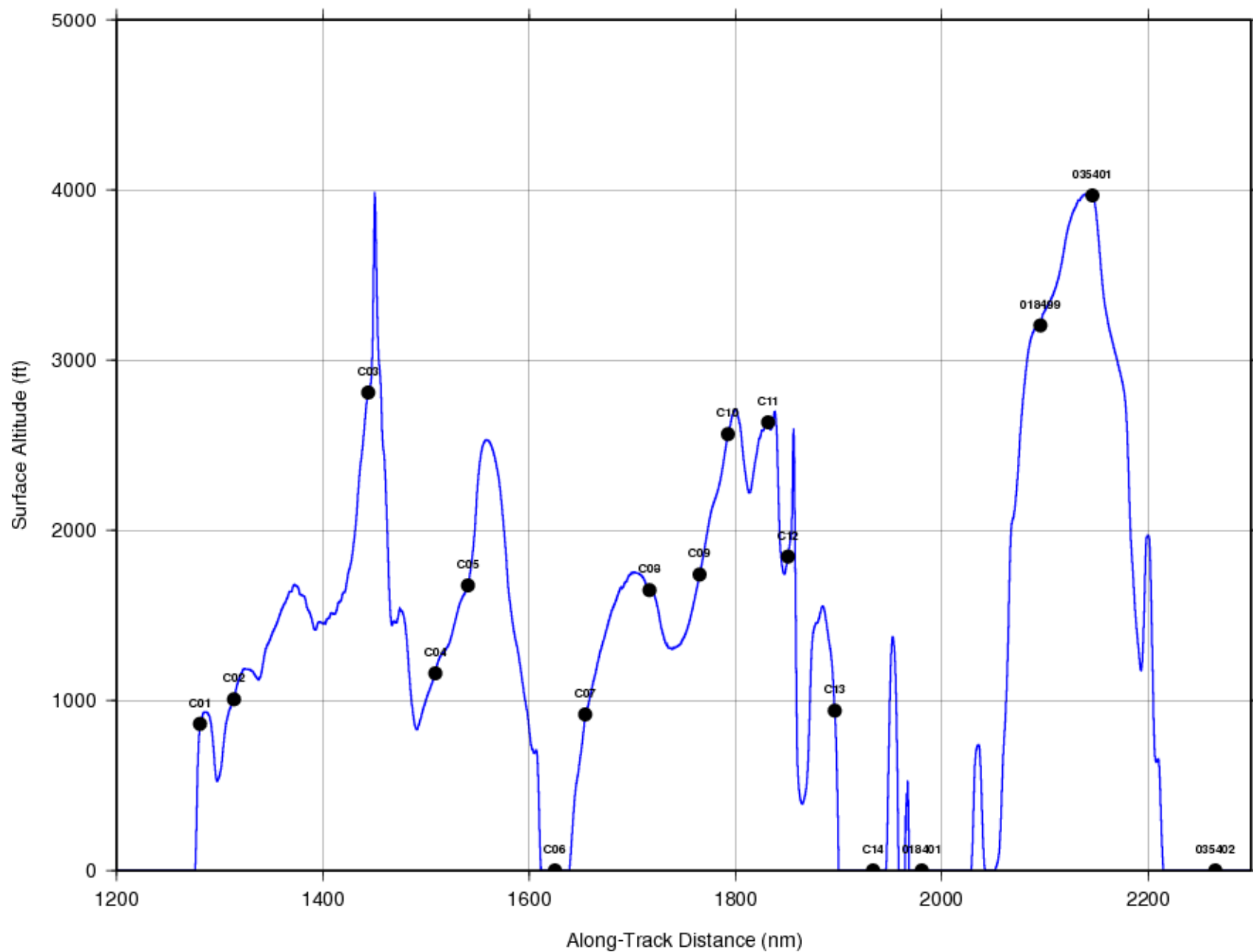


Thwaites-Smith-Kohler 3

10.7 hrs total / 3.9 hrs survey
440 knots transit / 250 knots survey

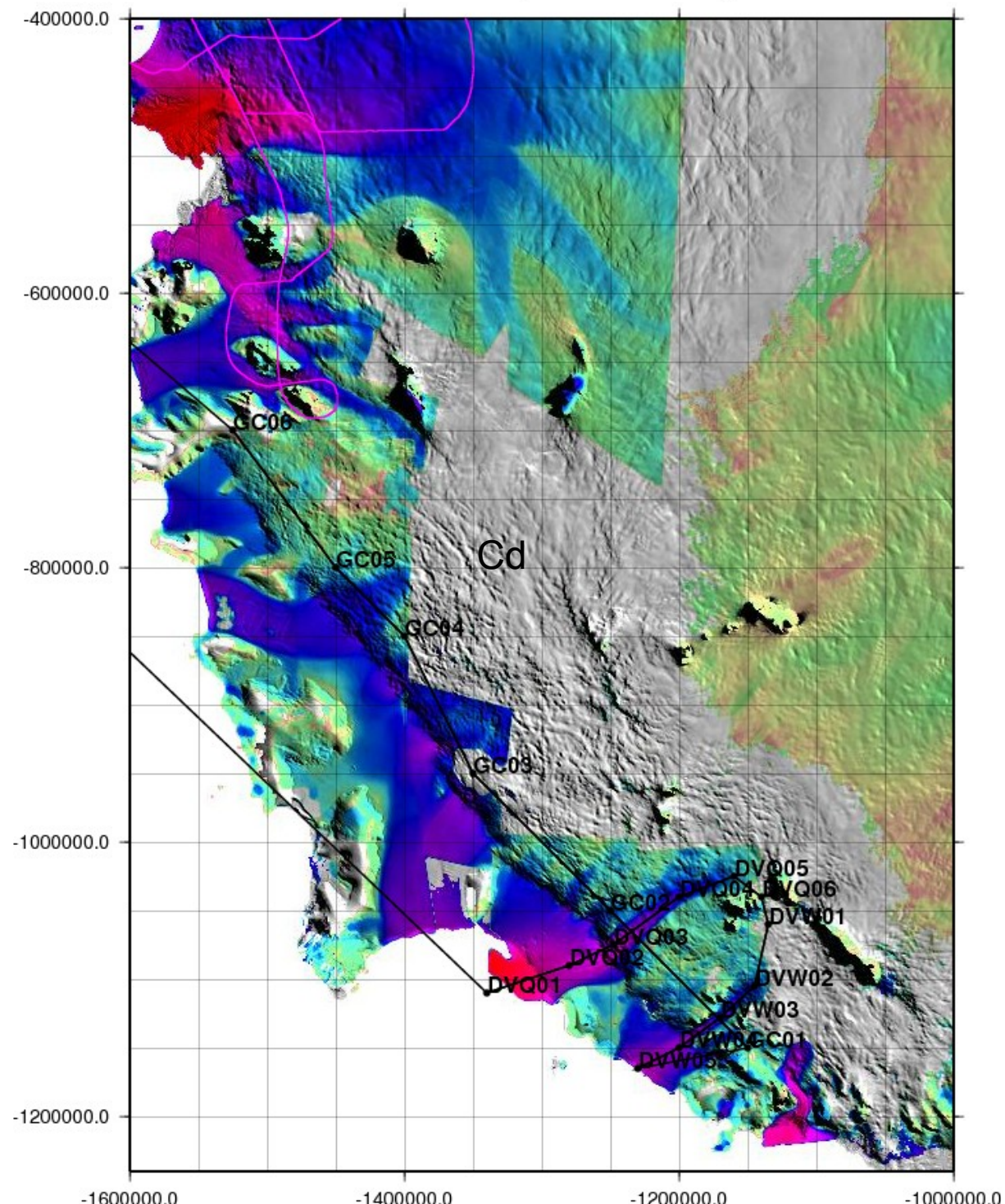


Terrain Profile for TSK 3 Mission



Getz 1

10.4 hrs total / 2.3 hrs survey
440 knots transit / 250 knots survey



Terrain Profile for Getz 1 Mission

